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The Economics of *Dentalium*

BY

R. B. CLARK

Department of Zoology, University of Bristol

(Plates 2, 3; 8 Text figures)

Dentalium shells, or tusk shells, served as money among the Indians of the United States and Canada, from Alaska to California and from the Pacific coast to the Dakota Territory (Fig. 1), until about the middle of the last century when contact with white traders resulted in cash, blankets and other trade goods replacing the *Dentalium* shells. There is nothing unusual in mollusc shells being used as currency among primitive peoples. Cowries were used over much of central Africa, the Indian Ocean, the Malay Archipelago and eastern Asia. Wampum of the aborigines of eastern Canada and the United States consisted of discs cut from mollusc shells (generally of bivalves) and the drilled-out columella of gastropod shells, threaded onto strings of sinew. The tribes of the southern half of California had similar strings of discs cut from *Saxidomus* and *Mytilus* shells and they also used *Olivella*. But the difference between all these other forms of shell money and *Dentalium* is that the raw material can be obtained intertidally whereas *Dentalium* shells are found washed ashore only infrequently and, as it transpires, damaged shells found on the beach had very little value in the Indians' eyes.

How did the Indians get their *Dentalium*, particularly as in my experience, the animal occurs only in relatively deep water? This problem has intrigued me for some years and I have made an intermittent and rather amateurish attempt to find the solution, though not with very great success. A number of the early accounts by anthropologists do not make zoological sense, while the more recent authorities appear to be slightly dubious about the

details of the whole thing. We are left with a most unsatisfactory state of affairs, and I have written what I have managed to find out so far, incomplete though it is, in the hope that someone will clear up the outstanding difficulties for me.

THE *DENTALIUM* OF THE INDIANS

Only three species of *Dentalium* appear to have been in use as money:

Dentalium pretiosum SOWERBY, 1860 (also referred to as *D. pretiosus* NUTTALL and *D. indianorum*). This is the only species that was ever in common use as currency among the north-western tribes. However, since species of *Dentalium* are difficult to identify, some of the earlier records refer, probably erroneously, to *D. entalis* LINNAEUS. BAIRD (1864) claimed that there was no material difference between north Pacific and north Atlantic species of *Dentalium* and referred them all to *D. entalis*, but this view has not been sustained and eleven species of *Dentalium*, one of *Siphonodentalium* and even of *Cadulus* are now recognized from the Pacific coast of north America from Alaska to Mexico (DALL, 1921). WHYMPER (1868) referred to the use of *D. entalis* by Indians at Fort Yukon in Alaska in 1867, but this is evidently another example of the failure to recognize the distinctness of the Pacific species.

Dentalium neohexagonum PILSBRY & SHARP, 1897 (also referred to as *D. hexagonum*). Strings of *Dentalium* found in old graves excavated on San Miguel Island (off the coast of southern California) and at San Luis



Figure 1: Regions of the United States and Canada in which *Dentalium* shells were formerly in use as currency and ornaments.

Obispo, California, include this species as well as *D. pretiosum* (STEARNS 1889). This appears to be the only recorded use of *D. neohexagonum*.

Dentalium entalis LINNAEUS (also referred to as *Entalis vulgaris*). This is the common north Atlantic species (HENDERSON, 1920); it does not occur in the Pacific and was never collected by the Indians. Early white traders among the Hidatsa and Gros Ventre Indians, which by 1850 inhabited eastern Montana and the northwestern part of the Dakota Territory, discovered *Dentalium* shells to be so highly prized by the Indians that they found it advisable to obtain supplies of shells for trading purposes. The shells used by the traders were imported from the east coast and were those of *D. entalis*. They were eventually introduced in such numbers that the currency became debased. STEARNS (1889) records that in 1866, "ten of these (imported) shells of inferior size, costing the traders only a cent apiece, would buy a superior buffalo robe," formerly, however, "only two or three of the same quality were paid for a robe." STEARNS was of the opinion that a great many of the *Dentalium* in circulation "in recent years" (i.e. before 1889) were of the north Atlantic species. Indeed, the tribes of the upper Missouri and Yellowstone rivers to whom STEARNS refers, were under the impression that all *Dentalium* shells came from the Great Lakes or the Atlantic coast and called them "Iroquois shells," though this may be a corruption of the Chinook "hyaqua" by which the currency was generally known throughout the area of its use. The Hidatsa and Gros Ventre Indians were members of the Salish linguistic group which extended to the shores of the Pacific, and there seems little doubt that the original trade routes for the shells were from the west.

THE NATURAL OCCURRENCE OF *DENTALIUM*

Dentalium is a scaphopod mollusc that lives partly buried in muddy sand below tide level and often at a considerable depth. The shell is conical and open at both ends. The reduced head and the conical foot can be protruded from the wider end which is buried, the mouth surrounded by extensible capitula for feeding, the foot with its lateral lobes for burrowing (MORTON, 1959). A respiratory current of water is pumped in and out of the hole at the narrower end of the shell which projects slightly about the surface of the substratum (YONGE, 1937).

Of the three species of *Dentalium* (Fig. 2) in use in North America as currency, *D. entalis* was imported by white traders who presumably dredged it off the New England coast; it need concern us no further.

Dentalium neohexagonum occurs off the coast of central and southern California, Mexico and central America

from Monterey to Guacomayo (DALL, 1921). Off Monterey it is abundant and occurs in sand at depths between 9 and 40 fms (KEEN, 1937; SMITH & GORDON, 1948). According to STEARNS (1889) it is as common at San Diego as *D. pretiosum* is in Puget Sound. This species and *Cadulus fusiformis* PILSBRY & SHARP, 1898 which seems never to have been used by Indians, are the only two common scaphopods off the Californian coast and neither occurs in water shallower than nine or ten fathoms. *Dentalium rectius* CARPENTER 1864, which is also reasonably common off Monterey, is a deep-water form and has not been found in less than 35 fms of water (SMITH & GORDON, 1948).

Dentalium pretiosum occurs from Alaska to San Diego (DALL, 1921, KEEN, 1937), but is rare in the southern half of its range (SMITH & GORDON, 1948). The southern form of this species differs from that in Puget Sound and that in circulation among the Indians, in that it is more curved, longer, narrower and altogether more fragile (SMITH & GORDON, 1948). At Monterey, this species is not usually found in less than 20 fathoms, although further north it may occur in shallower water. LORD (1864) records that in some sheltered bays on the west coast of Vancouver Island, it occurs in as little as 5 fathoms water, and it is general experience that cold-water, arctic species tend to live in deeper and hence colder water in the more southerly parts of their range (EKMAN, 1953). This is true of *D. pretiosum* on the Pacific coast and also of *D. entalis* which is the common shallow water species of the New England coast north of Cape Cod, but occurs on the continental slope at considerably greater depth off southern New England and the Virginia Capes (HENDERSON, 1920).

JOHNSON & SNOOK'S (1927) claim that *Dentalium* shells are "frequently" to be found on the shore between tide marks, and ROGERS' (1908) remark, apropos the Indians, that "the industrious beachcomber might soon become a man of means" appear to be exaggerated. *Dentalium* lives in fine, muddy sand, a deposit which is only found in relatively undisturbed waters. When the mollusc dies, the shell remains embedded in the sand and only the most exceptional changes in the water currents or uncommonly severe storms wash it ashore. In any case, such shells would have been of slight use to the Indians; only perfect shells achieved a high price and those few washed ashore are damaged and have lost their lustre as a result of wave-pounding and grinding. QUIGGIN'S (1949) comment that the live shells which have to be dredged are better coloured than dead shells which are washed ashore, is, of course, mistaken. *Dentalium* shells are white and in any case have the same color when in use as currency whether they had been collected alive or dead.



Figure 2: Distribution of *Dentalium pretiosum*, *D. neohexagonum*, and *D. entalis* off the American coasts.

THE COLLECTION OF *DENTALIUM*

Almost all the *Dentalium* in circulation appear to have been collected by the Nootka Indians (Fig. 3) of Vancouver Island (LORD, 1864; JENNESS, 1934), where the animals are accessible in relatively shallow water. Two sites where *Dentalium* could be collected were known to, and used by the Indians. These were both on the west side of Vancouver Island, one at Cahquos (Fig. 4), north-west of Tachu Point, and the other in Barkley Sound. The shells are also said to be washed ashore on Long Beach near Ucluetet, also in Nootka territory, and the Haida and Oregon Indians claim to have collected some

empty shells on their beaches (DRUCKER, 1951). Considering the very large number of *Dentalium* in circulation in north-western America, and the relative scarcity and poor quality of shells that could be found on the shore, it is clear that the *Dentalium* fisheries on Vancouver Island must have been effectively and intensively exploited over a long period of time.

Not all the Nootkan tribes fished for *Dentalium*. Use of the northern *Dentalium* grounds at Cahquos was reserved for certain chiefs of only the Chickliset, Kyoquot, Ehetisat and Neuchatelet Indians (Fig. 4), the four most northerly of the Nootkan groups. Of these, the chief of the Olakteicth, a Neuchatelet tribe, appears to have been

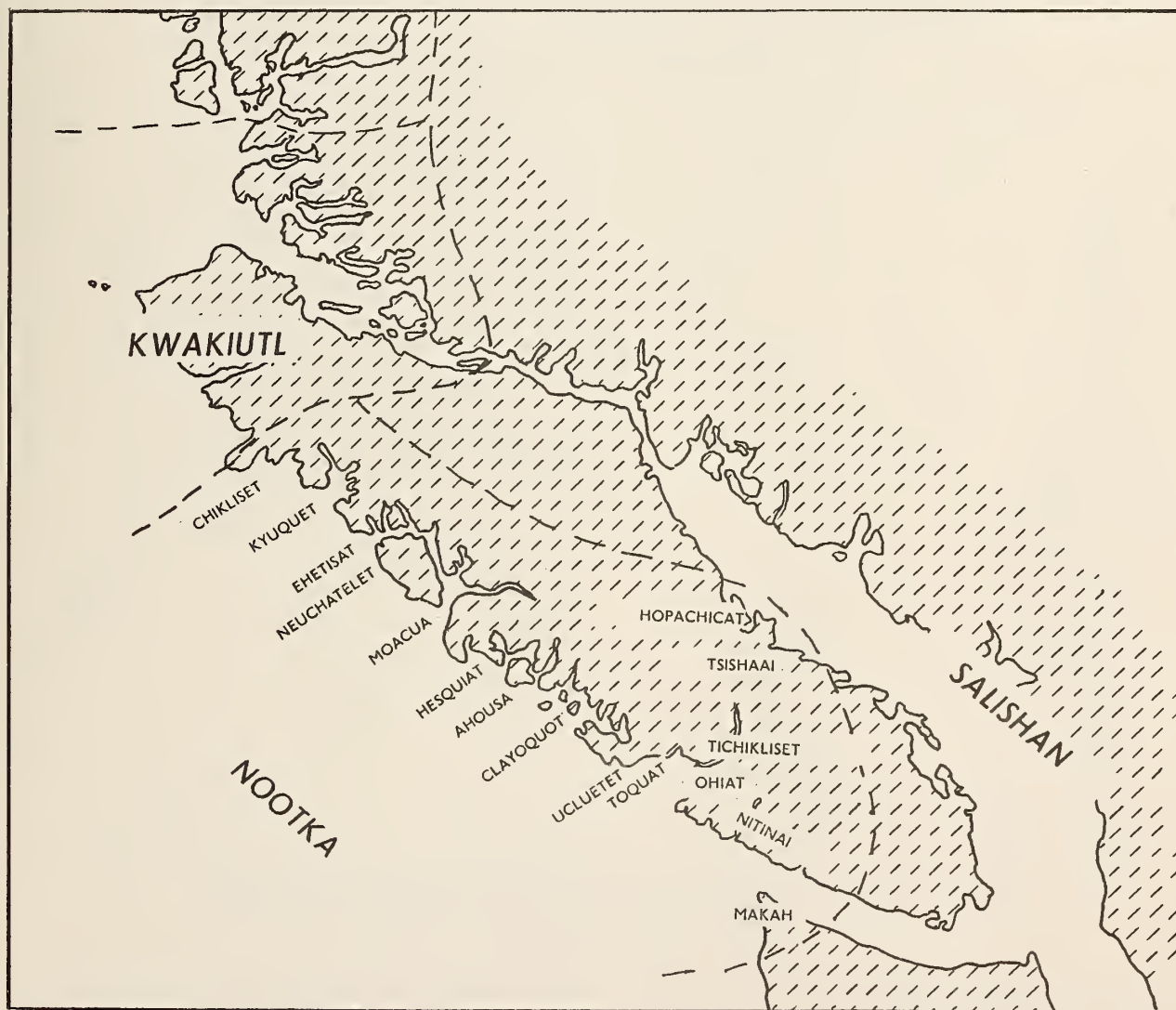


Figure 3: Tribal groupings of the Nootka Indians of Vancouver Island (after DRUCKER, 1951).

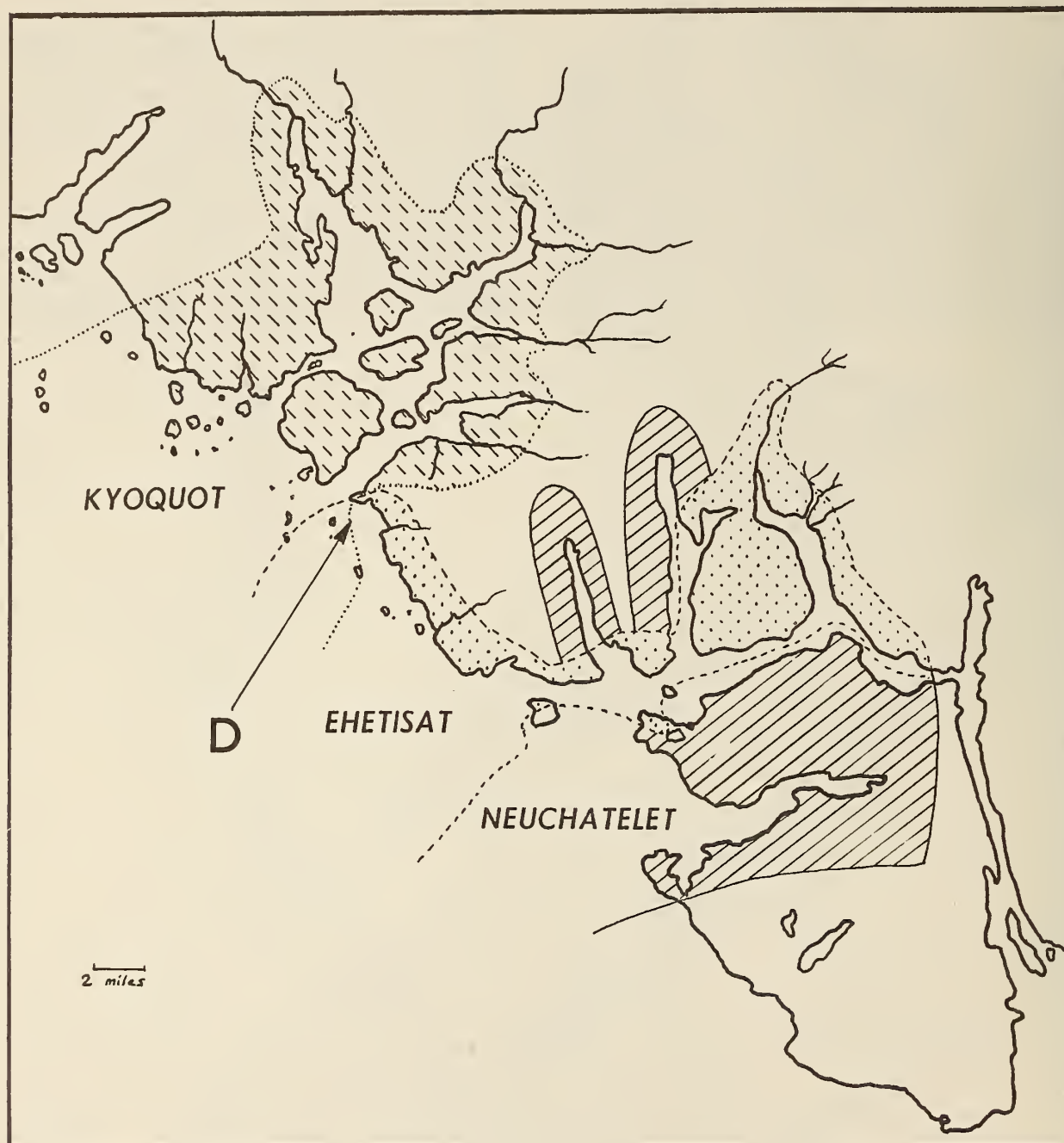


Figure 4: Territories of the Kyoquot, Ehetisat, and Neuchatelet confederations on Vancouver Island. The *Dentalium* fishery at Cahquos is indicated by the arrow.
(after DRUCKER, 1951.)²

the principal owner in recent times (i.e. since about 1850) and until the fishery ceased to be exploited. Ownership and fishing rights changed hands several times. At one time, the Cahquos fishery was owned by the Qwiwonas, a tribe of the Kyoquot confederation. They were tradi-

tionally the first men to be created after "the transformation of the world" and had certain priority of status and were owners of all the Kyoquot ocean frontage as well as the *Dentalium* fishery. It may be questioned whether their status and supposed priority of creation did not

spring from their wealth as owners of one of the two known sites where *Dentalium* might be collected. Such a reversal of cause and effect is not unknown in other peoples even today. Whatever the origins of the Quiwonas, they gave away their territorial rights as part of the dowry to the Tacisath, another Kyoquot tribe who, in turn, passed them to yet another tribe. However, both the Quiwonas and the Tacisath retained the right to fish for *Dentalium* at Cahquos even after these transfers of other rights. Other groups in the area presumably gained fishing rights at Cahquos because of the proximity of their settlements to the *Dentalium* grounds.

Fishing rights, most property rights and, indeed, the nominal ownership of all food produced by human labour, were vested in the chiefs who nominated a certain number of men to collect *Dentalium*. Salvage, including *Dentalium* shells, caught accidentally or found stranded on the beach belonged to the chief but, according to a Nootkan informant of DRUCKER (1951), articles of little value were generally given to the finder. Thus he might be permitted to keep a few *Dentalium*, "but if one found many, they had to be given to the chief."

Even though *Dentalium* occurs in relatively shallow water off the west coast of Vancouver Island, the task of collecting animals in 20 or 30 feet of water is not an easy one. However the Nootka were skillful boatmen in the violent seas of this coast. They were whalers and a whaling party of three to ten dug-out canoes, each about 30 feet long and manned by eight men, might spend three or four days at sea (STIRLING, 1955). They fished for *Dentalium* from boats and evolved several spears for the purpose, which differed in detail, though probably not in principle, from each other.

1. A specimen in the Provincial Museum, Victoria, B. C., was collected by Dr. C. F. Newcombe in 1911 at Kyoquot (text figure 5, left; Plate 2). It is 5 feet 8 inches long with a tapered shaft of ash or some similar wood and has a bundle of yellow cedar prongs attached to one end. The prongs are protected by six tapered boards. Two stone weights are securely lashed to the base of the shaft with braided cedar-bark rope and a long rope is tied to the spear near the stones.

This is probably the type of apparatus used in the manner described by Jewett (1896). It was lowered to the sea-bed in 50 or 60 fathoms of water, raised a few feet and dropped on the bottom several times, and then hauled to the surface in the hope that a few *Dentalium* shells had become wedged between the prongs of the spear.

2. Another spear in the Provincial Museum and collected by Dr. Newcombe in 1914 at Nootka, is 6 feet long and has an untapered shaft of cedar (Fig. 5, right). The prongs are a good deal longer than in the previous spear and are of hardwood splints. The prongs are protected by four spear-shaped boards and are lashed together with cedar-

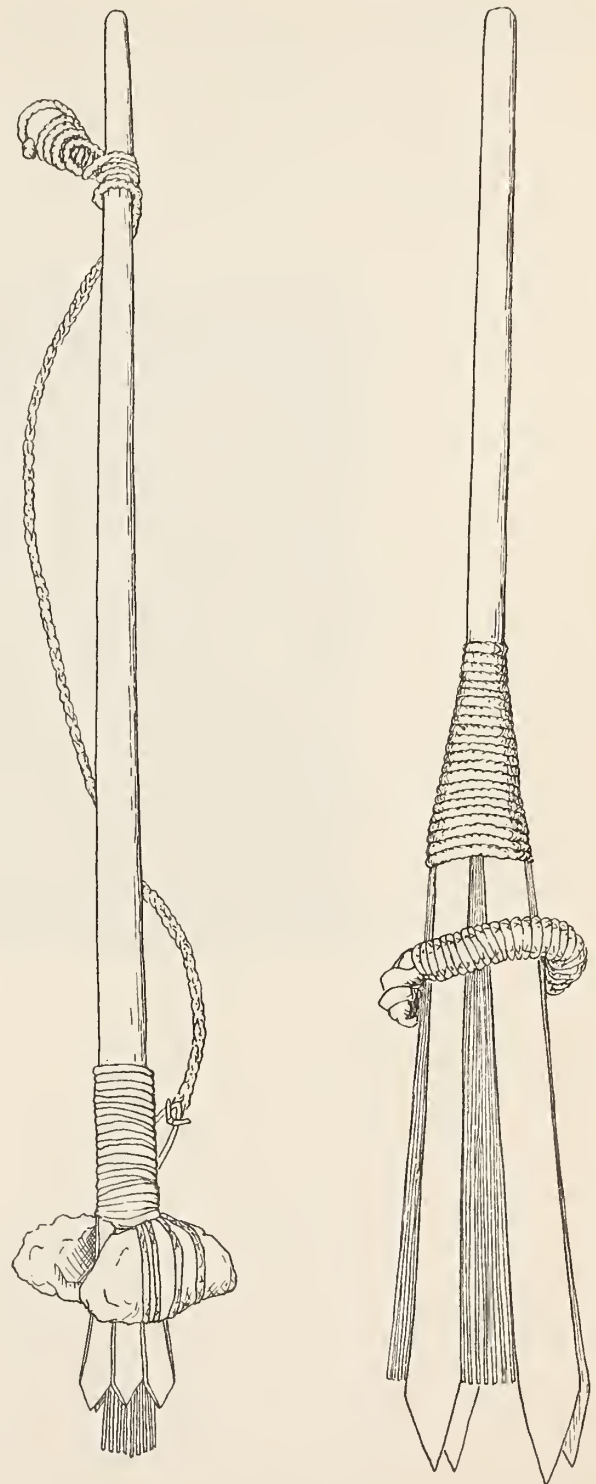


Figure 5: Two types of Nootkan *Dentalium* spear (types 1 and 2 in the text). (Based on drawings supplied by the Provincial Museum, Victoria, B.C.)

bark rope. There is a woven cedar-bark grommet around the splints and this can slide almost to the end of them.

This spear was used in a similar manner to the former, except that it was held in the hand and jabbed against the seabed. Obviously it could only be used in relatively shallow water, although additional lengths could be lashed to the shaft until the spear touched bottom (see below). According to a note in the Victoria Provincial Museum catalogue, "the rope grommet slipped down over the prongs as the spear was withdrawn after striking the bottom, so compressing the prongs," but this seems unlikely. More probably, as Dr. Wilson Duff (*in litt.*) suggests, the grommet was used to keep the prongs compressed when the spear was not in use, to prevent them splaying and so becoming useless for catching *Dentalium*. It is also possible, though perhaps less likely, that the grommet could be adjusted to give the required compression on the prongs during use.

3. DRUCKER (1951) described a variant of the previous spear. The implement is similar to the former except that the grommet is replaced by a wooden board with a round hole in it and a stone weight lashed to each end of the board. This fitted over the broom and slid down over the prongs when it was jabbed in the sand, compressing the prongs around any *Dentalium* which may have been caught. A heavily weighted board would behave in this way whereas a rope grommet would not. DRUCKER states that additional lengths were lashed to the shaft to give the required length.

4. LORD (1864) described a fourth type of *Dentalium* spear. It had a long deal shaft to the end of which a strip of wood was fixed transversely and a number of bone pegs driven into it so that it resembled "a long comb with the teeth very wide apart." This, it is said, was stabbed into the sand two or three times and then drawn to the surface with *Dentalium* impaled on the bone prongs. LORD believed that *Dentalium* lived buried in the sand with the wide end of its shell pointing upwards. If this were so, it would be easy to understand how the spear might work, but as *Dentalium* in fact lives the other way up, it is not clear if LORD's account is a mistaken one of a variety of one of the foregoing spears, or if the description is correct but the implement was used in a different way or even for another purpose. As it is, it sounds unlikely that many *Dentalium* could have been collected with it.

5. ROGERS (1908) writes of the Indians collecting *Dentalium* shells by combing the bottom with a long finetoothed rake. It is not clear if this is an independent observation or is an abbreviated quotation from another author. Apart from the implication that the pegs were close together, this account may refer to a similar implement to that described by LORD. According to Miss ROGERS, the operation was conducted from a canoe, but it is difficult to imagine that this could have been as ef-

fective a technique for gathering *Dentalium* as the better authenticated methods.

THE USES AND VALUE OF *DENTALIUM*

Among the Nootka, wealth was measured in territorial holdings, privileges, titles, etc., and *Dentalium* shells were used only as ornaments (Fig. 6). Both sexes wore shells as ear pendants and, more commonly among the women, as nose ornaments, though the nasal septum of both boys and girls was pierced. The women also wore *Dentalium* necklaces and an important use of the shells was as the



Figure 6: *Dentalium* and *Haliotis* shell ornament.
(After STEARNS, 1889.)

hair ornaments which pubescent girls wore, for one or two months in the case of commoners, or eight to ten months for a chief's daughter. The hair ornaments were the property of the chief and he hired them out for use, though a man with a succession of daughters might apparently compound the hire charges and buy the shells outright.



The end of the *Dentalium* spear illustrated in Figure 5 (left).

The *Dentalium* are unlikely to have been caught in the manner suggested in the photograph.

(No. 2231 in the Provincial Museum, Victoria, B. C.)

Dentalium was never used by the Nootka as currency; indeed they did not attach precise monetary values to anything. Luxury articles might be given at potlatches but there was no fixed scale of values in *Dentalium* shells or blankets as in the other coastal tribes. After Captain Cook's visit to Nootka territory in 1778, the Nootka came into contact with white traders who exchanged steel knives, copper kettles and blankets for sea-otter furs. The furs were carried to China and traded for tea, which was then sold in Boston where the knives, etc., came from. This three-way trade flourished until the sea-otter became virtually extinct. In the mid 19th century Nootkans were employed on whalers working from American and Canadian ports and as a result of this prolonged contact with whites, their customs gradually changed. Cash, cotton blankets, gowns and cloth predominated as gifts at potlatches and *Dentalium* shells declined in importance and were used solely as ornaments. The *Dentalium* fishery waned and went out of use.

Other Indian groups from Puget Sound to Alaska appear, like Nootka, to have used *Dentalium* shells as ornaments (Plate 3) and as a sign of wealth, though LORD (1864) records that earlier in the 19th century they had reckoned monetary values in *Dentalium*. Outside this area, where the shells were naturally scarcer, they had a precise monetary value. Since coastal tribes traded with tribes of the interior for nephrite (jadeite), a stone which could be polished and given an edge and was used for adzes, chisels, etc., for native copper, furs and skins, and the horns of mountain sheep and goats (MARTIN, QUIMBY & COLLIER, 1947), it is likely that the practice of evaluating articles in terms of *Dentalium* shells evolved among the coastal Indians as a result of their contact with peoples outside the area.

Among tribes in Washington and north-western Oregon, the standard measure of length was the fathom—the extent of the outstretched arms—and a fathom line of 40 shells represented the highest monetary unit (GIBBS, 1873). At the time when GIBBS was writing, such a string was worth five dollars, though formerly it would have purchased a slave. A fathom line made up of more than 40 shells had a correspondingly smaller value depending upon the number of shells needed to complete it.

The Chinook and Klikitat appear to have been largely responsible for trading the shells with tribes further inland and to the south. Naturally the recipient had to be content with fewer and rather more inferior shells than tribes near Puget Sound, and monetary values soared. We have already seen that the Hidatsa in the Dakota territory valued only two or three shells as equivalent to a buffalo robe as late as the 1850's or 1860's, and used *Dentalium* so extensively as currency that white traders were forced to import their own supply of shells (STEARNS, 1889). But it was in northern California, on the southern fringe

of the *Dentalium* belt, that the shells acquired the highest and most precise monetary value.

Even in early times native Californians appear to have had a highly developed financial sense. According to DRUCKER (1951) an elaborate system of currency and money values was evolved in north-western California "where the people haggled and split hairs over microscopic variations in the few dentalia that reached them." Actually the number of shells may not have been so small. According to POWERS (quoted in STEARNS, 1889) immense quantities were at one time in circulation and there must have been a continual influx of shells to replace the wastage caused by sacrifices on the deaths of wealthy men and, among the tribes of the coast range, by propitiatory sacrifices of wealth. POWERS estimated that "in early days" (presumably the first half of the 19th century) every Indian in the state possessed an average of one hundred dollars worth of *Dentalium* shells.

Strings of shells (Figs. 7, 8) were evaluated slightly

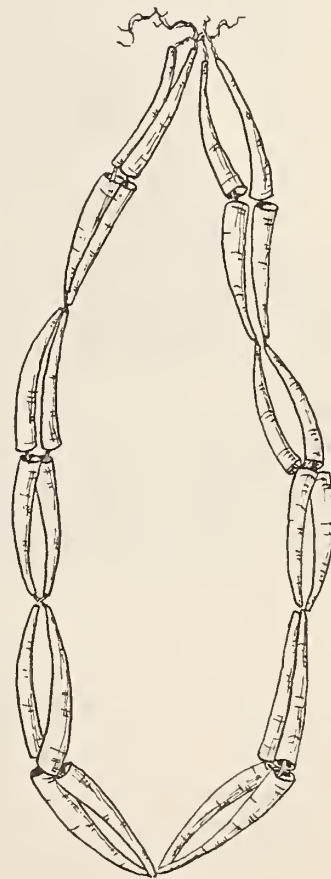


Figure 7: String of shell-money (allicochick) from the west coast of North America. (After STEARNS, 1889.)